

# Using Inclusive Language in the Applied-Science Academic Environments

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**Abstract.** Language is not neutral or used in a vacuum; language is one of the most powerful tools we have as humans that incorporates personal assumptions, social norms, and cultural ideologies. It is therefore important to consider language critically and to watch for biases in usage. Language reflects the world it is used in, but it is also active in maintaining or redesigning that world. It can be a tool of discrimination or of empowerment. We can use it to foster discrimination, unintentionally or otherwise, or we can use it to help make a fairer world [1]. Words have the power to affect our personhood, our identity, our attitudes, and our images about others. The power of language to affect our identity and behaviour was realized by oppressed groups in the 20<sup>th</sup> Century. Language is an important part of socialization - it plays a crucial part in the process whereby people learn the behaviours and values of a particular group or culture [2]. Historically, language has left many out. Individuals and groups have been marginalized and discriminated against because of their culture, race, ethnicity, gender, sexual orientation, age, disability, socioeconomic status, appearance, and more. Inclusive language seeks to treat all people with respect, dignity, and impartiality. It is constructed to bring everyone into the group and exclude no one. It is suggested that the basis of communication is not what is said, but how the words are heard. Language framed by derogatory names and symbols can have implications for people and their life experiences [3]. Making changes to use more inclusive language offers us a chance to grow and become better communicators who care for those we are communicating with [4]. This short article is meant to review the concept of political correctness and inclusive language and raise awareness for students and teachers to discriminatory terms that can be easily replaced with clearer and less-offensive alternatives. This topic has been vastly discussed in social sciences and a great number of theories and articles have shed light on the importance of this topic. The goal of this paper is to communicate these ideas to a larger audience including educators in applied sciences including Science, Technology, Engineering and Math (STEM).

**Keywords.** education, inclusive language, political correctness.

## 1. Introduction

In the late '70s, the term Politically Correct (PC) entered the public lexicon. Some used the term to dismiss views that were seen as too rigid and, also, to poke fun at themselves for the immense care they took to neither say nor do anything that might offend the political sensibilities of others. Some latched on to the term and used it to deride left-leaning voices. Politically correct changes are occurring in English and in many other languages to reflect ideas of tolerance and inclusion. It is mandatory for educators to explore this phenomenon and to give learners opportunities to become proficient users of tolerant and inclusive terms [5].

Language is not just a tool of expressing one's thoughts; language is also an instrument to shape these thoughts. As such, PC language is a tool that can be employed to make students more sensitive, more tolerant, and more understanding. The classroom provides an invaluable setting for discussion of political (in)correctness. Students have to be encouraged to develop strategies to navigate such discussions, strategies that serve them well across languages [6]. Many terms have been studied, discussed, replaced, or proposed as a result of these discussions [7][8]. This paper tries to provide a brief review of these concepts to raise awareness to educators in various disciplines who might not be aware of the importance of inclusive language. In the following subsections, instances of political correctness are presented and reviewed.

### *1.1 Political Correctness and Public*

"Politically correct" is defined as "agreeing with the idea that people should be careful not to use language or behave in a way that could offend a particular group of people." In simple words, political correctness is nothing more than treating others with respect - it is not censorship [9]. It has been shown that replacing even a single politically-correct term with a politically-incorrect one — "illegal" vs. "undocumented" immigrants for example — makes people view a speaker as more authentic and less likely to be swayed by others [10]. In another study, the levels of perceived trustworthiness of people in power were found to be substantially lower for those who express politically-incorrect views, compared with those who express contrasting politically-correct views [11].

### *1.2. Political Correctness and Artificial Intelligence*

Artificial Intelligence (AI) is heavily based on Machine Learning (ML), where computer systems perform a specific task without using explicit instructions by relying on existing patterns. The risk of creating deliberately politicized AI is not taken seriously and has rarely been examined. Distorting word-embedding models is just one method through which AI can be subtly bent to serve the agenda of its creators. It has been shown that word embedding trained on Google News articles exhibit female/male gender stereotypes to a disturbing extent. A ML system will offensively answer "man is to computer programmer as woman is to x" with x = homemaker [12]. Such dynamics in STEM environments make it harder for female professionals to build effective work relationships and to belong [13].

There have also been efforts to use AI to eliminate offensive language, for example, Microsoft's "Ideas in Word," refers to a series of AI-driven features that help format documents and improve writing by underlining words or phrases that sound insensitive and suggesting corrections [14].

## **2. Technical Jargon**

Readily accepted technical jargon may also have dirty connotations; examples of such terms are presented in [15][16]. Similarly, some technical jargon can be deemed as offensive, racist, and politically incorrect.

Language and metaphors matter. Accurate metaphors can be useful in simplifying complex technical concepts. Despite (or because of) the widespread acceptance of potentially offensive jargon, such terms should be replaced with alternative metaphors that are more accurate and less distracting [17]. In this section, some of these terms are discussed.

### *2.1. Master-Slave*

In the world of software or electronics, the terms "master" and "slave" are often thrown around in documentation. Master/slave is a model of dualistic communication where one device or process has unidirectional control over one or more other devices [18]. In the technology

industry, these words have been used for a long time and have become part of numerous standards since 1986. In 2004, Master/Slave computer jargon was on the top of politically-incorrect terms of the year according to the Global Language Monitor (GLM) [19]. The master/slave terminology is also used in Finite Element Analysis (FEA) to distinguish elements from each other (See Figure 1).

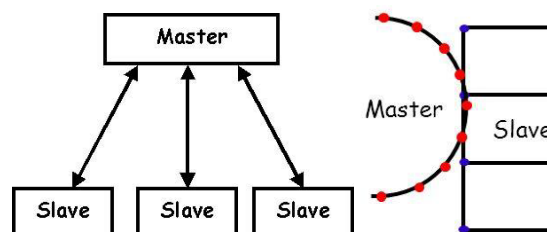


Figure 1. Master-slave topology in communication [20] and in FEA [21]

In 2003, the Los Angeles County issued a request that any electronics manufacturers doing business with the county remove the terms master and slave from their products [22]. In 2018, Python announced that for diversity reasons, it would be nice to try to avoid master and slave terminology which can be associated with slavery [23]. Socially-neutral terms were offered for replacement.

The proposed change is not the whim of some developer, but a genuine desire for different programming languages and technologies. Similar changes are provided in Redis, Drupal, CouchDB, and Django. For example, Django and CouchDB replaced the master-slave terms with the leader-follower [20]. These changes have been under scrutiny by some developers for being unnecessary and confusing [24].

Racist and sexist language is rampant and similarly counter-productive. The terms “master-slave,” are present in other realms of technology, notably “automotive clutch and brake systems, clocks, flip-flop circuits, computer drives, and radio transmitters”. The ubiquitous word “robot” is the Czech word for “slave”.

Master-slave is an offensive metaphor that will and should never become fully detached from history [25]. Aside from being offensive, it stifled the participation of students. The master-slave metaphor may have been accepted for popular use when the vast majority of engineers were homogeneous, but in today’s diverse environment we must consider the impact such terms have. This is especially so for students who have been touched by slavery and, more importantly, their desire to pursue and lend their talents to certain fields. Several alternative options have been suggested in the literature for replacement:

- Primary-secondary
- Primary-replica
- Leader-follower
- Active-standby
- Writer-reader
- Coordinator-worker
- Parent-helper

## 2.2. Blacklist-Whitelist

The metaphorical use of white-black to connote good-evil is offensive. While master-slave might seem like a more egregious example of racism, white-black is arguably worse because it is more pervasive and therefore more insidious. The association of white with good and black with evil is known as the “bad is black effect”. Muhammad Ali in an interview done in the ’80s said: “...We got some stuff called white house cigars, white swan soap, king white soap, white cloud tissue paper... The angel food was the white cake and the devil’s food was the chocolate cake. Santa Claus was white and everything bad was black. The little ugly duckling was a black

duck, and the black cat was the bad luck, and if I threaten you I am going to blackmail you...” [26].

There have been proposals to cleanse the Microsoft and Google open-source codes of potentially-offensive terms in the codebase with alternatives to rid the software blueprints of language such as whitelist (change to allowlist), blacklist (change to blocklist), and other infelicities [27].

### **3. Political Correctness and Gender**

STEM fields have been historically male-dominated and, despite efforts to attract more females, a masculine culture still exists in these fields. The effects of sexist language are not negligible. Language enables us to order and categorize the world. If our language is biased, our ordering and categories will be inaccurate. Children thus inherit the same harmful biases. Awareness is the first step; action is the second [1]. This section discusses some of the issues related to the proper use of inclusive language with respect to gender. Studies have shown that women responded to the use of gender-exclusive language (he) during a mock job interview with a lower sense of belonging, less motivation, and less expected identification with the job compared to others exposed to gender-inclusive (he or she) or gender-neutral (one) language. Subtle linguistic cues that may seem trivial at face value can signal group-based ostracism and lead members of the ostracized group to self-select out of important professional environments [28]. Studies have revealed that language-use intentions are embedded in explicit sexist ideologies. The effects of sexist beliefs on language emerged through deliberate mechanisms involving attitudes and intentions [29].

#### *3.1. Gender in Engineering*

It is widely perceived that engineering has an image problem which makes it difficult to attract men as well as women. Arguably there is an image problem impairing attempts to recruit women, since the classic stereotype of an engineer is heavily gender marked – the man who is “in love” with technology but rather socially withdrawn if not socially inept.

To promote a more inclusive environment, it is recommended to avoid appealing to gender stereotypes in recruitment campaigns. It is also important to increase awareness of the gender norm and visibility issues facing female engineers amongst engineering educators, in engineering workplaces, and in the profession at large [30].

The majority of current gender in engineering scholarship utilizes a conceptualization of gender which does not acknowledge or incorporate more than two gender options and is rooted in increasingly rejected notions of biological essentialism. Non-binary and gender-nonconforming students exist in liminal spaces throughout society and higher education. The continuation of this scholarship tacitly denies their existence by framing gender as intrinsically linked to two biological categories. Engineering professionals, faculty, and students who identify as neither men nor women must be included, and our conversation be expanded for an academically rigorous investigation into gender dynamics and create inclusive engineering spaces. We must continue to make space for marginalized gender identities and gendered experiences [31].

#### *3.2. They*

In the English language, the word “he” is used to refer to males and “she” to refer to females, but some people identify as neither genders. The first form of discrimination and prejudice is a denial that a group or person exists. In relation to gender-nonconforming people, the use of incorrect pronouns is seen as that denial [32]. Sharing one’s pronouns and asking for others’

pronouns when making introductions has become a growing trend in academic environments to maximize the students' ability to control their identity.

Writers have long been frustrated by the lack of a neat way to refer to someone of unknown gender. In recent years, use of singular "they" with known individuals have been promoted for those who do not identify as male or female [33]. The Canadian government recommends "themselves" as the reflexive form of the singular "they" for use in Canadian federal legislative texts [34]. Many organizations, including most publishers, had issued guidelines on the use of gender-neutral language. This use of the singular "they" annoys some grammarians who argue that "they" should only be used to refer to plural nouns. However, English has a precedent for a plural pronoun coming to be used in the singular - the pronoun "you." Until the 17<sup>th</sup> Century, a single person was addressed with "thou" and "thee." Later "you" became perfectly acceptable in both plural and singular [35].

### 3.3. *Guys*

The term "guys" was originally a reference to British historical figure Guy Fawkes, but in the mid-18<sup>th</sup> Century, it began being used in the United States to mean "men" generally. With no good phrase for the plural of "you," the plural term "guys" ended up evolving into the colloquial alternative to refer to a group of people [36]. Nowadays the term does not always mean "males in the plural," but critics argue the term is sexist because, while claiming to be gender-neutral, it actually positions men as the "default." For women in male-dominated industries, the use of "guys" to address the whole can reinforce their sense of being in the minority. The term is also problematic to gender-nonconforming people for whom "guys" could be an instance of misrepresentation. Arguably, one of the reasons "guys" has persisted for so long is that the English language does not offer many easy replacements. However, we can simply use "hey all" or "everybody" or "people" as an alternative to "hey guys" [37].

Likewise, groups of women should not be referred to as "girls" at work because it is belittling and offensive. Here are a few other phrases that are not to be used when talking to or about women in the office: Girls, Bossy, Feisty, Ball busting, Bitch, Shrill, Sweetie, or honey-bun [38].

### 3.4. *Gender of Connectors and Fasteners*

In electrical and mechanical trades and manufacturing, each half of a pair of mating connectors or fasteners is conventionally assigned the designation male or female. The "female" connector is generally a receptacle that receives and holds the "male" connector. On occasion, the terms "male" and "female" are respectively referred to as the A and B ends though the names of some standards conflict with this as they contain the letters A or B within the name. Sometimes the less ambiguous terms plug and socket or jack are used, particularly in reference to electrical connectors [39]. Some alternative options for these terms have been proposed unofficially [40].

### 3.5. *Gay*

The concept and meaning of the word "gay" have changed significantly over the last five centuries. In 1637, the word "gay" described a state of immortality. By the late 17<sup>th</sup> Century the term referred to the state of being addicted to pleasures. The word gay was used for female sex workers (gay woman), a womanizer (gay man), or a brothel (gay house). By the early 20<sup>th</sup> Century, "gay" was less of a social faux pas as men and women who decided to remain single were associated with the concept. Following post-war social reform and Western societies moving back towards more conservative positions in the 20<sup>th</sup> Century, the word "gay" began to be associated more explicitly with sexual deviancy. By 1952, "gay" meant someone who went



against common societal expectations and an individual (most often a man) who was mentally ill and criminally inclined.

Coming into the 21<sup>st</sup> Century, and in-line with international Gay Pride movements, the term “gay” no longer denotes mental illness or criminality. However, the word has retained its connection to homosexuals (particularly men) and its relation to social and sexual deviance. In this timeframe, the word is often used derisively. Beginning in the ‘80s and especially in the late ‘90s, the usage as a generic insult became common among young people. While the current use of the word “gay” is being acknowledged as homophobic and derogatory, its use remains pervasive and detrimental [3].

### *3.6. Transgender Terminology*

Definitions of normative and culturally-recognizable sex and gender are not acceptable for some transgender people, as such trans communities coin new terms such as hir and s/he to identify and define transgender. Using such terms helps to make transgender people definable, recognizable, and visible, to include them in social and cultural structures [41]. Transgender experience is fundamentally grounded in language, and no account of contemporary trans politics would be complete without attention to the way gender is constructed through language. Although transphobia and cissexism may not be eliminated through changes to language alone, identifying cissexist language patterns is a critical step towards dismantling the oppression trans people experience [42]. [43] suggests the following rules for educators in addressing their students:

- Do not assume that all students are heterosexual.
- Do not assume that being LGBT is a problem.
- Do not “out” people.
- Let the students self-identify.
- Do not assume that a student’s gender identity and biological sex are the same.
- Watch for connotative bias: Terms such as “alternative lifestyle” or “sexual preference” suggest the element of choice. “Sexual orientation” on the other hand does not.
- Consider the power of words: The vernacular is full of expressions that marginalize gays and lesbians.
- Avoid negative comments about gender expression such as “Act like a man”, “Don’t be such a sissy”, or “You throw like a girl”.

### *3.7. Gender-Neutral Substitutions*

Removing gendered terms and implementing gender-neutral alternatives has been slowly happening for decades in colleges, companies, municipalities, and organizations [44]. Anytime you are talking about a topic where gender is not the issue, but you use a gendered term, you immediately send a message of exclusion. Research shows that both women and men are less inclined to act on job ads that contain phrasing biased against their gender. Studies have also shown that when words like man are used generically to refer to people, readers tend to picture men only. This kind of language helps subordinate women in social and political relations [1]. Male-based generics are another indicator of a system in which men are privileged over women [45]. Though levels of acceptance vary for each of the words, Table 1 offers some examples of possible gender-neutral substitutions for some gendered terms.

Table 1. Gender-neutral substitutions [46][47][48][49][50]

Instead of ...	You could substitute ...
chairman	chair or chairperson
draftsman	Draftsperson / drafter
fireman	firefighter
fraternities / sororities	collegiate Greek system residences
freshman	first-year student
girls (for adults)	women
handyman	handyperson
manholes	holes, maintenance holes, sewer holes
manhours	workhours
manmade	synthetic, manufactured, artificial
manpower	human resources, labour, staff, personnel, workers, workforce
man to man	face to face
Mr. / Miss. / Mrs. / Ms.	Mx.
tradesman	tradesperson / tradespeople

#### 4. Political Correctness and Disability

Decisions about language have important socio-cultural meanings in the disability community, and erasure of the term “disability” can evoke fear and frustration among those who claim a disabled identity and align with disability culture [51]. Various words and concepts used to describe disability all have their own histories and implications for people with disabilities. Being “politically correct” does not make a term automatically inoffensive to a group of people. Many “politically correct” words and phrases referring to disability can be insulting to some of the people to whom these labels are attached. Saying “differently-abled” or “special,” for instance, may seem on the surface to convey that someone with a disability has positive qualities about them [52].

Laws have been passed in different parts of North America in recent years to replace “handicapped” with “having a disability” and “idiot, lunatic, a person of unsound mind” with “person adjudicated incompetent,” and “person with alcoholism” in the place of “common drunkard.” These moves are not merely politically correct word-policing but legitimate attempts to ease the debilitating stigma attached to mental illness and developmental disability. The impulse to define people by a characteristic, in particular a disability or an illness, is very dehumanizing [53].

##### 4.1. Person-First Language

One of the developments in the field of inclusive language is the “people-first” language or expressions that place the person in the first place. Apart from the standard lexical changes of expressions with a dysphemistic connotation, this approach envisaged a syntactic change that would put the person before the disability [54].

“People-first” or “person-first” language is a way of describing disability that involves putting the word “person” or “people” before the word “disability” or the name of a disability, rather than placing the disability first and using it as an adjective. Some examples of people-first language might include saying “person with a disability,” “woman with cerebral palsy,” and “man with an intellectual disability.” The purpose of people-first language is to promote the idea that someone’s disability label is just a disability label—not the defining characteristic of the entire individual. The basic reason behind members of these groups’ dislike for the application of people-first language to themselves is that they consider their disabilities to be

inseparable parts of who they are. Some argue that using person-first language makes the disability into something negative, which can and should be separated from the person [52].

When speaking about disability, it is suggested to avoid phrases that imply victimhood, e.g. “afflicted by”, “victim of”, “suffers from”, “confined to a wheelchair”. It is highly recommended to steer clear of euphemisms like “challenged”, “differently-abled”, or “specially-abled”. Also, avoid derogatory terms that stem from the context of mental health, such as “crazy”, “mad”, “schizo”, or “psycho” [53].

#### *4.2. R-Word (Retarded)*

“That’s so retarded,” or “don’t be such a retard,” are frequent statements casually said in society. There is a gross misunderstanding about the meaning of the word and why it is offensive in the first place. The definition of the word “retarded” is “Offensive: slow or limited in intellectual or emotional development.” At one point in time “mental retardation” was a medical term used to describe a person with an intellectual disability. However, since May 2013, this term has been replaced with the more accurate and accepting “intellectual disability.” [54]

The R-word is an exclusive term that furthers negative stereotypes about people with disabilities. It can be hurtful whether it is directed towards a person with a disability or when used as a synonym for “dumb” or “stupid” [55]. The many meanings associated with the word retarded demonstrate the fluidity of language. Many advocates are pushing to change the term mental retardation as a classification category and abandon the “R” word in everyday language in much the same way the “N” word has been abandoned [56].

#### *4.3. Lunatic*

The word “lunatic” has been codified into law and the psychiatric profession. The word stems from the Latin “luna” meaning moon, with the “atic” suffix meaning “of the kind of” referred to as a kind of insanity supposedly dependent on the phases of the moon [53]. Recently, in some legal documents, the term “lunatic” has been replaced with “person who is legally incompetent.”

### **5. Reclaiming**

When members of a group “reclaim” a word, they take a term that was previously used against them as a slur and give it a positive meaning as an expression of solidarity and pride in one’s identity. For instance, members of the lesbian, gay, bisexual, and transgender (LGBT) communities have reclaimed the term “queer,” a long-time degrading term for LGBT peoples. Similarly, some disability cultural groups have reclaimed negative terms like “crip.” While it may be appropriate for someone who is a member of a group to use a term in a reclaimed way due to having the personal experiences that allow them to understand when, why, and how to use such a term, it may not be appropriate for someone outside of the group to do so [52].

### **6. Conclusion**

Heightened awareness of the sociological implications of language exists today and PC language has entered some elements of society. However, while PC language is expected in public, professional, and academic life it has not yet entered the vernacular mainstream. Changing language has not changed society, but if these changes make inroads into the intellectual community’s thought processes it can, at least, be a beginning [57]. Language is changing and exclusive terms are on the way out [2]. Some individuals may feel that using language considered polite or inoffensive is unnecessary, but offensive language is offensive for a reason. There has been a promising but slow trend to replace politically-incorrect terms



with less-offensive phrases. Words can move from benign meanings to hurtful ones or be reclaimed from harmful use into empowered phrases. Some organizations have also taken steps to roll back technical hard coding of their standards implementations. In this paper, we reviewed some of the discriminatory and non-inclusive terms related to technology, health, workplace, and gender to raise more awareness of this topic for educators in STEM fields.

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